

# Nitrogen and Sulphur Interaction Effect on Onion (*Allium cepa* L.) Plant Growth and Bacterial Bulb Rot Development

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## Introduction

- The Genus *Allium* belongs to the family *Alliaceae*, which includes 500 species.
- Allium* are valued for their culinary and medicinal properties.
- Derived from four non-protein sulphur amino acid compounds.
- Onion (*Allium cepa* L.) is the most commercially important species among the *Allium* family.
- In Nova Scotia, the total area, and value of onion bulb production, mainly occurring in the Annapolis Valley.
- Approximately 5,590 ha, and \$3 million, respectively.
- Nova Scotia produce more than 85% of the total onion bulbs in the Maritime.
- It is estimated that greater than 20% of onions are lost in storage to bulb rot in Nova Scotia.

## Objectives

- The purpose of this project is to determine N and S Interaction Effects on Onion (*Allium cepa* L.) Plant Growth and Bulb Rot Diseases Development

## Materials and Methods

- This experiment was a four by three factorial (i.e. N and S fertilizer application rates) split plot design with four replications.
- The N rate was 0, 30, 60 and 90 kg N/ha using urea (46-0-0) as the source and the S rate was 0, 30, and 60 kg S/ha using Epsom salt (magnesium sulphate, MgSO<sub>4</sub>) as the source of S.
- Both N and S was applied in two splits by side-dressing at four and eight weeks after planting.
- Nitrogen (N) and sulphur (S) fertilizer trial. Treatments N1, N2, N3 and N4 was 0, 30, 60 and 90 kg N/ha; Treatments S1, S2 and S3 was 0, 30, and 60 kg S/ha, respectively.
- The total number of plots was 4 (N) x 3 (S) x 4 (replications) = 48.
- The size of the individual experimental plot for each N x S treatment was 6m in length on a plant row (1.42m) with 0.4m spacing between reps and a 1m spacing between N treatments.

- Thus, the total area of the entire experimental field was 30m x 10m.

## Results and Discussion



N Treat	N	Mean	Group
3	12	59.2556	A
4	12	58.5267	A
2	12	56.8267	A
1	12	44.4450	B

There was no significant difference between the treatments for N2, N3, N4 however there was a significant difference between those three and N1 (p-value = 0.000) and S treatments shown no significant effect (p-value = 0.560). Treatment, S and N shown interaction (p-value = 0.960).



N Treat	N	Mean	Group
4	12	17.3500	A
2	12	16.0431	A
3	12	15.9239	A
1	12	11.9792	B

Bulbs weight value show no difference for N2, N3, N4 however there was a significant difference between N1 and those three (p-value = 0.002). The S treatment show no significant difference for all the treatment (p-value = 0.078), and there was also no interaction between N and S for the analysis of variance for the bulbs weight (p-value = 0.872).

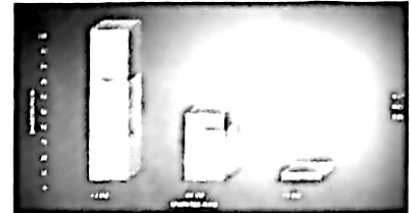


N Treat	N	Mean	Group
4	12	69.639	A
2	12	69.454	A
3	12	66.561	A
1	12	60.980	B

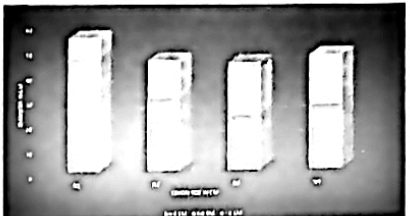
The bulbs diameter result was the same as Spad value and bulbs weight, except there is similarity between N3 and N1

Treatment	Spad value	Bulbs weight	Diam Avg
N%			
0	44.4450b	11.9792b	60.9800 b
30	56.8267a	16.0431a	69.4542a
60	59.2558a	15.9239a	66.5617ab
90	58.5267a	17.3500a	69.6392a
S%			
0	.	.	.
30	.	.	.
60	.	.	.
N x S			
N	**	**	.
S	.	.	.
N x S	ns	ns	ns

Table 1. N x S effects on onions. \*\*, Significant, \*, Non-significant, NS- No relationship P-value level at 0.05



Graph.1 Showing three onions size base on S %  
The graph shows no difference for S1, S2 and S3 for onion size < 6 cm, however there was a difference between S1 and S2 and S3 for size 6-8 cm, and for sizes > 8 cm there was no difference in S1, S2 and S3.



Graph.2 Showing three onions size base on N %  
there was a significant difference between N1 and N2, N3, N4 for producing onion size > 6 cm, and there was no significant between N2, N3, N4 for producing onion 6-8 cm, and non of treatment show any difference for producing onion > 8 cm

## Conclusion

- S application had no significant (p < 0.05) effect on plant growth of onion,
- N and S have shown no interaction effect on plant growth.
- N application have shown significant effect on plant growth for the SPAD value and Bulbs weight and shown insignificant effect for bulb

## Acknowledgement

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## Reference

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